EVAPORATED $LaAlO_3$ FILMS FOR GATE DIELECTRICS

ABSTRACT

A gate dielectric containing $LaAlO_3$ and method of fabricating a gate dielectric contained $LaAlO_3$ produce a reliable gate dielectric having a thinner equivalent oxide thickness than attainable using SiO_2. The $LaAlO_3$ gate dielectrics formed are thermodynamically stable such that these gate dielectrics will have minimal reactions with a silicon substrate or other structures during processing. A $LaAlO_3$ gate dielectric is formed by evaporating Al_2O_3 at a given rate, evaporating La_2O_3 at another rate, and controlling the two rates to provide an amorphous film containing $LaAlO_3$ on a transistor body region. The evaporation deposition of the $LaAlO_3$ film is performed using two electron guns to evaporate dry pellets of Al_2O_3 and La_2O_3. The two rates for evaporating the materials are selectively chosen to provide a dielectric film composition having a predetermined dielectric constant ranging from the dielectric constant of an Al_2O_3 film to the dielectric constant of a La_2O_3 film. In addition to forming a $LaAlO_3$ gate dielectric for a transistor, memory devices, and information handling devices such as computers include elements having a $LaAlO_3$ gate electric with a thin equivalent oxide thickness.

"Express Mail" mailing label number: EV041074555US
Date of Deposit: February 20, 2002
This paper or fee is being deposited on the date indicated above with the United States Postal Service pursuant to 37 CFR 1.10, and is addressed to the Commissioner for Patents, Box Patent Application, Washington, D.C. 20231.